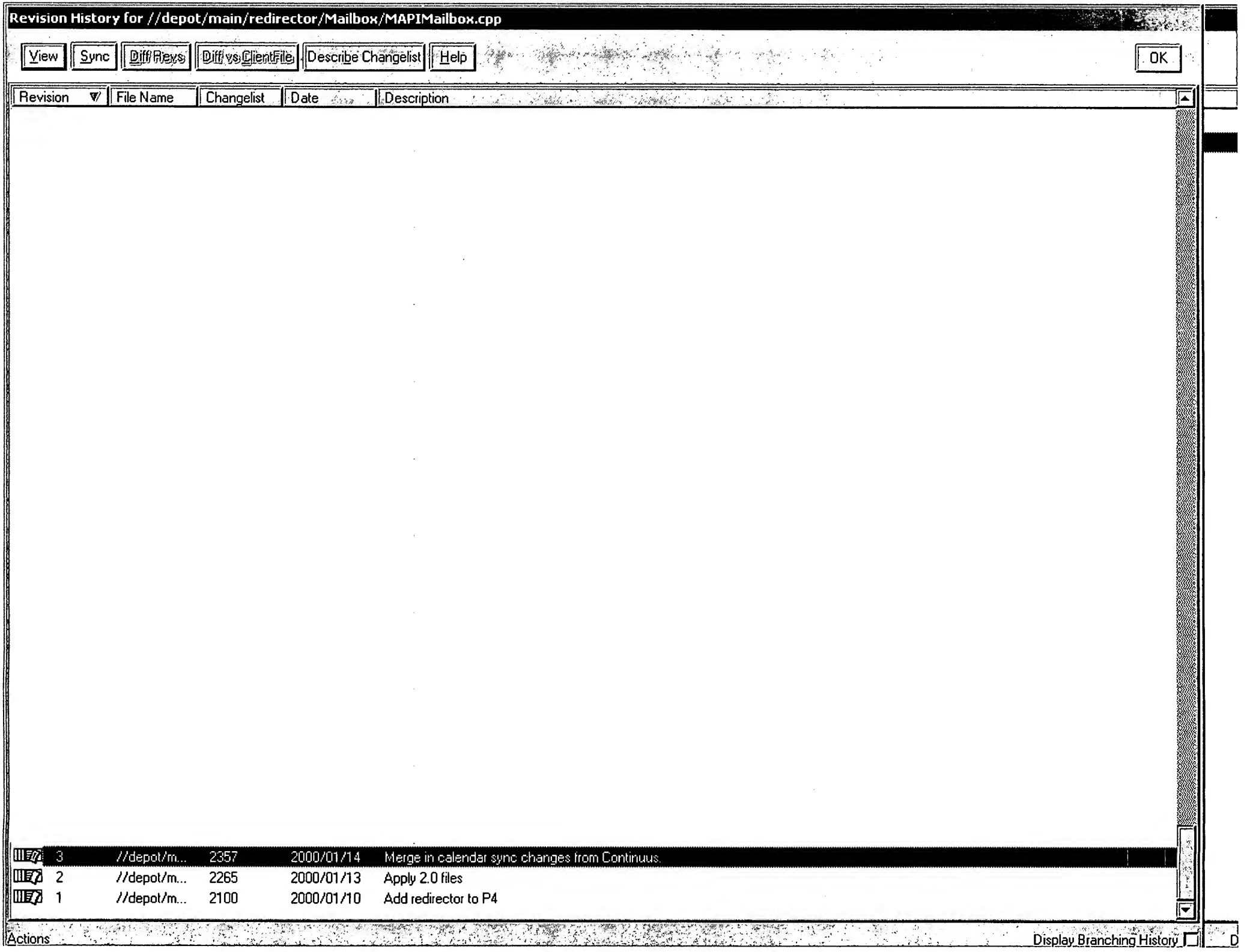
Revision History for //depot/main/redirector/Mailbox/MAPIMailbox.cpp
View
Sync
Diff Revs
Diff vs ClientFile
Describe Changelist
Help
OK
Revision
File Name
Changelist
Date
Description
3 //depot/m... 2357 2000/01/14 Merge in calendar sync changes from Continuus.
2 //depot/m... 2265 2000/01/13 Apply 2.0 files
1 //depot/m... 2100 2000/01/10 Add redirector to P4
Actions
Display Branching History

```
/*****************************************************************************
 MAPIMailbox.cpp

 (C) 1997 Research In Motion Ltd.
*****************************************************************************/

#pragma warning( disable:4201 )
#pragma warning( disable:4514 )

#include "MAPIMailbox.h"

#include <assert.h>
#include <stdio.h>

#include "MAPIMailboxNotify.h"
#include "MailboxManager.h"
#include "globals.h"
#include "rimmessage.h"
#include "rimcalendar.h"
#include "rimstream.h"
#include "debug.h"
#include "Mutex.h"
#include "timeconversion.h"
#include "ICSAgent.h"
#include "CalICSAgent.h"
#include "icalformat.h"
#include "calsyncstate.h"

Mutex g_DebugMutex;

// Recurrence blob related structures and constants

#define _SECOND ((_int64) 10000000)
#define _MINUTE (60 * _SECOND)
#define _HOUR   (60 * _MINUTE)
#define _DAY    (24 * _HOUR)

const USHORT TYPE_DAILY = 0x200A;
const USHORT TYPE_WEEKLY = 0x200B;
const USHORT TYPE_MONTHLY = 0x200C;
const USHORT TYPE_YEARLY = 0x200D;
```

```
_cleanup:
   try
   {
      // resource cleanups
      if( lpIStreamBody ) {
         lpIStreamBody->Release();
      }

      return( rc );

   }
   catch( ... )
   {
      ReportException(mailbox_fcn);

      return( rc );

   } // Exception-handling

}

// *** RIMEventtoCDOAppointment ***
// Purpose: Copies the Event properties into the corresponding members of the provided
//        CDO appointment object.
// Parameters:
// Returns:
//

bool MAPIMailbox::RIMEventtoCDOAppointment( RIMEvent *pEvent, AppointmentItemPtr &spAppointmentItem )
{
   static const char mailbox_fcn[] = "RIMEventtoCDOAppointment";

   assert( pEvent );

   RecipientsPtr        spAppointmentRecipients;
   RecipientPtr         spAppointmentAttendee;
   RecurrencePatternPtr   spAppointmentRecurrence;

   RIMEvent::FrequencyType ApptFrequency;
   bool                fInstanceRecurrence = false;
   time_t              tStartTime;
   FILETIME            ftStartTime;
   SYSTEMTIME          stStartTime;
```

```
11870   DOUBLE              dStartTime;
        time_t              tEndTime;
        FILETIME            ftEndTime;
        SYSTEMTIME          stEndTime;
        DOUBLE              dEndTime;
        long                lAppointmentRefId = 0;
11875   long                lParentRefId = 0;
        long                lDeviceSeqNum = 0;
        bool                rc = true;

        try
11880   {
          /* Get the UID (our ref Id) */
          RIMEvent::UIDProperty* pAppointmentUID;
          if( !pEvent->GetProperty( &pAppointmentUID ) )
          {
11885       DebugLog::Printf( DebugLog::LOG_WARNING,
                      "MAPIMailbox::RIMMeetingtoMAPIMeeting - Getting UIDProperty from RIMCalendar failed for %s.",
                      m_Name );
            rc = false;
            goto _cleanup;
11890     } // if
          lAppointmentRefId = pAppointmentUID->GetUID();

          /* Get the RelatedTo Id */
          RIMEvent::RelatedToIDProperty* pAppointmentRelatedTo;
11895     if( pEvent->GetProperty( &pAppointmentRelatedTo ) )
          {
            lParentRefId = pAppointmentRelatedTo->GetRelatedToID();
          }

11900     /* Get the Sequence # */
          RIMEvent::SequenceProperty* pAppointmentSequenceNum;
          if( !pEvent->GetProperty( &pAppointmentSequenceNum ) )
          {
11905       DebugLog::Printf( DebugLog::LOG_WARNING,
                      "MAPIMailbox::RIMMeetingtoMAPIMeeting - Getting SequenceProperty from RIMCalendar failed for %s.",
                      m_Name );
            rc = false;
            goto _cleanup;
          } // if
11910     lDeviceSeqNum = pAppointmentSequenceNum->GetSequenceNumber();
```

```
/* Get the Summary */
RIMEvent::SummaryProperty* pAppointmentSummary;
if( pEvent->GetProperty( &pAppointmentSummary ) )
{
  spAppointmentItem->PutSubject( _variant_t(pAppointmentSummary->GetSummary()) );
}
/* Get the Location */
RIMEvent::LocationProperty* pAppointmentLocation;
if( pEvent->GetProperty( &pAppointmentLocation ) )
{
  spAppointmentItem->PutLocation( _variant_t(pAppointmentLocation->GetLocation()) );
}
/* Get the Description */
RIMEvent::DescriptionProperty* pAppointmentDescription;
if( pEvent->GetProperty( &pAppointmentDescription ) )
{
  RIMStream DescriptionStream = pAppointmentDescription->GetDescription();
  DescriptionStream.Seek(); // Rewind
  unsigned int BodyLength = pAppointmentDescription->GetAvailableSize();
  unsigned char *pBodyText = new unsigned char[ BodyLength+1 ];
  memset(pBodyText, 0, BodyLength);
  DescriptionStream.Read(pBodyText, BodyLength);
  pBodyText[BodyLength] = '\0';
  _bstr_t bstrBody((const char *)pBodyText);
  spAppointmentItem->PutText(bstrBody);
  delete []pBodyText;
}
else
{
  // Set a blank message body
  spAppointmentItem->PutText(_bstr_t(""));
} // if

/* Get the Trigger */
RIMEvent::TriggerProperty* pAppointmentTrigger;
if( pEvent->GetProperty( &pAppointmentTrigger ) )
{
  spAppointmentItem->PutReminderSet(_variant_t(1L,VT_I4));
  spAppointmentItem->PutReminderMinutesBeforeStart( _variant_t(pAppointmentTrigger->GetTrigger()) );
}
/* Get the DateTimeStart */
RIMEvent::DateTimeStartProperty* pAppointmentDateTimeStart;
if( !pEvent->GetProperty( &pAppointmentDateTimeStart ) )
```

```
11955   {
          DebugLog::Printf( DebugLog::LOG_WARNING,
                    "MAPIMailbox::RIMMeetingtoMAPIMeeting - Getting DateTimeStartProperty from RIMCalendar failed for %s.",
                    m_Name );
          rc = false;
11960     goto _cleanup;
        } // if
        // The long road to convert this to a variant time
        tStartTime = pAppointmentDateTimeStart->GetTime();
        UnixTimeToFileTime(tStartTime, ftStartTime);
11965   FileTimeToSystemTime(&ftStartTime, &stStartTime);
        SystemTimeToVariantTime(&stStartTime, &dStartTime);
        spAppointmentItem->PutStartTime( _variant_t(dStartTime,VT_DATE) );
        /* Get the DateTimeEnd */
        RIMEvent::DateTimeEndProperty* pAppointmentDateTimeEnd;
11970   if( !pEvent->GetProperty( &pAppointmentDateTimeEnd ) )
        {
          DebugLog::Printf( DebugLog::LOG_WARNING,
                    "MAPIMailbox::RIMMeetingtoMAPIMeeting - Getting DateTimeEndProperty from RIMCalendar failed for %s.",
                    m_Name );
11975     rc = false;
          goto _cleanup;
        } // if
        // The long road to convert this to a variant time
        tEndTime = pAppointmentDateTimeEnd->GetTime();
11980   UnixTimeToFileTime(tEndTime, ftEndTime);
        FileTimeToSystemTime(&ftEndTime, &stEndTime);
        SystemTimeToVariantTime(&stEndTime, &dEndTime);
        spAppointmentItem->PutEndTime( _variant_t(dEndTime, VT_DATE) );
        /* Get the Attendee(s) */
11985   RIMEvent::AttendeeProperty* pAppointmentAttendee;
        spAppointmentRecipients = spAppointmentItem->GetRecipients();
        pEvent->GetProperty( &pAppointmentAttendee );
        while( pAppointmentAttendee )
        {
11990     _bstr_t bstrAddress = "SMTP:";
          bstrAddress += _bstr_t(pAppointmentAttendee->GetAddress());
          spAppointmentRecipients->Add(_variant_t(pAppointmentAttendee->GetDisplayName()), _variant_t(bstrAddress), _variant_t((long)CdoTo) );
          pEvent->GetNextProperty( &pAppointmentAttendee );
        } // while
11995   /* Get the Recurrence Pattern, if any */
        RIMEvent::RecurrenceRuleProperty* pAppointmentRecurrence;
        if( pEvent->GetProperty( &pAppointmentRecurrence ) )
```

```
{
  spAppointmentRecurrence = spAppointmentItem->GetRecurrencePattern();
  // Following items set no matter what the recurrence type is
  spAppointmentRecurrence->PutOccurrences(_variant_t(pAppointmentRecurrence->GetCount()));
  spAppointmentRecurrence->PutInterval(_variant_t(pAppointmentRecurrence->GetInterval()));
  ApptFrequency = pAppointmentRecurrence->GetFrequency();
  // Items that may or may not be present based on recurrence type
  if( pAppointmentRecurrence->GetDay() != RIMEvent::UNDEFINED_DAY )
  {
    spAppointmentRecurrence->PutDayOfWeekMask(_variant_t(pAppointmentRecurrence->GetDay()));
  }
  if( pAppointmentRecurrence->GetMonth() != RIMEvent::UNDEFINED_DAY )
  {
    spAppointmentRecurrence->PutMonthOfYear(_variant_t(pAppointmentRecurrence->GetMonth()));
  }
  if( pAppointmentRecurrence->GetMonthDay() != 0 )
  {
    spAppointmentRecurrence->PutDayOfMonth(_variant_t(pAppointmentRecurrence->GetMonthDay()));
  }
  if( pAppointmentRecurrence->GetSetPosition() !=0 )
  {
    fInstanceRecurrence = true;
    spAppointmentRecurrence->PutInstance(_variant_t(pAppointmentRecurrence->GetSetPosition()));
  }
  switch(ApptFrequency)
  {
    case RIMEvent::DAILY:
      spAppointmentRecurrence->PutRecurrenceType(_variant_t((long)CdoRecurTypeDaily));
      break;
    case RIMEvent::WEEKLY:
      spAppointmentRecurrence->PutRecurrenceType(_variant_t((long)CdoRecurTypeWeekly));
      break;
    case RIMEvent::MONTHLY:
      if( fInstanceRecurrence )
        spAppointmentRecurrence->PutRecurrenceType(_variant_t((long)CdoRecurTypeMonthlyNth));
      else
        spAppointmentRecurrence->PutRecurrenceType(_variant_t((long)CdoRecurTypeMonthly));
      break;
    case RIMEvent::YEARLY:
      if( fInstanceRecurrence )
        spAppointmentRecurrence->PutRecurrenceType(_variant_t((long)CdoRecurTypeYearlyNth));
      else
        spAppointmentRecurrence->PutRecurrenceType(_variant_t((long)CdoRecurTypeYearly));
```

```
                break;
            } // switch
        } // if
    }
    catch (_com_error &e)
    {
        _bstr_t bstrSource(e.Source());
        _bstr_t bstrDescription(e.Description());
        DebugLog::Printf( DebugLog::LOG_INFORMATIONAL,
                "*** CDO ***  MAPIMailbox::MAPIMailbox( ) - Code = %08lx, Code meaning = %s, Source = %s, Description = %s.",
                e.Error(), e.ErrorMessage(), (LPCTSTR) bstrSource, (LPCTSTR) bstrDescription);
        rc = false;
    }
    catch( ... )
    {
        rc = false;
    }
_cleanup:

    return( rc );
}

// *** Send ***
// Purpose:
// Parameters:
//
bool MAPIMailbox::Send( RIMMessage* pMessage, LPMESSAGE* ppMAPIMessage, bool bDeleteAfterSubmit,
            int origRefId, bool insert_text, bool insert_attach, FOLDERS eFolder )
{
    static const char mailbox_fcn[] = "Send(ppMAPIMessage)";

    assert( pMessage );
    assert( ppMAPIMessage );

    LPMESSAGE      pOrigMessage = 0;
    HRESULT        hResult;
    bool           bRetCode = false;

    try
    {
        //DebugLog::Printf( DebugLog::LOG_DEBUG, "*** MAPI ***  Sending message from %s", m_Name );

        if ( origRefId != 0 )
```

```
{
  static const char mailbox_fcn[] = "TransferAppointmentReceivedNotification";

  EntryID *pEntry = new EntryID( m_pSession, EntryIDValue , EntryIDSize );
  assert( pEntry );

  // Notify user control.
  m_pControl->AppointmentModifiedNotification( pEntry );

  return;
}

void MAPIMailbox::TransferAppointmentDeletedNotification( unsigned long SourceKeyIDSize, unsigned char * SourceKeyIDValue )
{
  static const char mailbox_fcn[] = "TransferAppointmentReceivedNotification";

  EntryID *pSourceKey = new EntryID( 0, SourceKeyIDValue , SourceKeyIDSize );
  assert( pSourceKey );

  // Notify user control.
  m_pControl->AppointmentDeletedNotification( pSourceKey );

  return;
}

// *** Synchronize ***
// Purpose:
// Parameters:  pAppointment = RIM calendar
// Returns: true if appointment sync'd successfully.  Otherwise, false.
//
bool MAPIMailbox::Synchronize( RIMCalendar* pAppointment )
{
  static const char mailbox_fcn[] = "Synchronize";

#ifndef PERSONAL_BUILD // No calendar support for desktop redirector

  ResetLastError();

  LPMAPITABLE      pContentsTable = 0;
  LPSRowSet        pRows = 0;
  LPMESSAGE        pRootAppointment = 0;
  LPMAPITABLE      pAttachTable = 0;
  LPATTACH         pAttachment = 0;
```

```
    LPSRowSet         pAttachRows = 0;
    LPSBinary         pbinStateSourceKey = 0;

    FolderPtr         spCalendarFolder;
14195 AppointmentItemPtr spAppointmentItem;
    MessagesPtr       spCalendarMessages;
    FieldsPtr         spAppointmentFields;
    FieldPtr          spAppointmentSourceKey;

14200 variant_t         vtAppointmentSourceKey;
    SRestriction      sSourceKeyRes;
    SPropValue        spvSourceKey;
    HRESULT           hResult;
    bool            bResult = false;
14205
    const ULONG       nAppointmentProps = 7; // # of appointment properties

    SizedSPropTagArray( nAppointmentProps, sptaAppointmentProps ) =
      { nAppointmentProps,
14210   {
          PR_ENTRYID,
          PR_SOURCE_KEY,
          PROP_TAG(PT_LONG, 0x0E23),
          PR_RIM_CAL_APPT_DURATION,
14215     PR_RIM_CAL_START_DATETIME,
          PR_RIM_CAL_END_DATETIME,
          PR_LAST_MODIFICATION_TIME
        }
      };
14220
    const ULONG       nAttachProps = 5; // # of attach properties

    SizedSPropTagArray( nAttachProps, sptaAttachProps ) =
      { nAttachProps,
14225   {
        PR_ATTACH_LONG_FILENAME,
        PR_ATTACH_FILENAME,
        PR_ATTACH_MIME_TAG,
        PR_ATTACH_NUM,
14230   PR_ATTACH_METHOD
        }
      };
```

```
14235   try
        {
          RIMCalendar::MethodProperty*       pAppointmentMethod = 0;
          RIMCalendar::CalendarEventProperty* pCalendarEvent = 0;
          RIMEvent                    CalendarVevent;
          long                        lApptRefId = 0;
14240     long                        lApptParentRefId = 0;
          long                        lApptDeviceSeqNum = 0;
          time_t                      tInstanceDate = 0;
          long                        lStateParentRefId = 0;
          FILETIME                    ftStateLastModified;
14245     FILETIME                    ftStartTimeFilter;
          FILETIME                    ftEndTimeFilter;
          FILETIME                    ftInstanceDate;
          FILETIME                    ftLastModified;
          SYSTEMTIME                  stLastModified;
14250     variant_t                   vtLastModified;
          long                        lStateDeviceSeqNum = 0;
          long                        lStateDesktopSeqNum = 0;
          bool                        fStateDelInProgress = false;
          bool                        fStateModInProgress = false;
14255     bool                        bFound = false;

          // Determine the request method: PUBLISH or CANCEL
          // Calendar method
          if( !pAppointment->GetProperty( &pAppointmentMethod ) )
14260     {
            DebugLog::Printf( DebugLog::LOG_WARNING,
                      "MAPIMailbox::Synchronize - Getting MethodProperty from RIMCalendar failed for %s.",
                       m_Name );
            bResult = false;
14265       goto __end;
          }

          // Loop over VEVENT components contained in the calendar object
          if( !pAppointment->GetProperty( &pCalendarEvent ) )
14270     {
            DebugLog::Printf( DebugLog::LOG_WARNING,
                      "MAPIMailbox::Synchronize - Getting CalendarEventProperty from RIMCalendar failed for %s.",
                       m_Name );
            bResult = false;
14275       goto __end;
          }
```

```
while( pCalendarEvent )
{
  CalendarVevent = pCalendarEvent->GetCalendarEvent();

  // Get the CDO calendar folder object.
  if( spCalendarFolder == 0 )
  {
    spCalendarFolder = m_spCDOSession->GetDefaultFolder((long)CdoDefaultFolderCalendar);
  }

  // Find state info, if it exists, for this item using ref id
  lApptRefId = 0;
  lApptParentRefId = 0;
  lApptDeviceSeqNum = 0;
  spAppointmentItem = 0;
  spAppointmentFields = 0;
  spAppointmentSourceKey = 0;
  if( pbinStateSourceKey )
  {
    MAPIFreeBuffer( pbinStateSourceKey );
    pbinStateSourceKey = 0;
  } // if

  /* Get the UID (our ref Id) */
  RIMEvent::UIDProperty* pAppointmentUID;
  if( !CalendarVevent.GetProperty( &pAppointmentUID ) )
  {
    DebugLog::Printf( DebugLog::LOG_WARNING,
              "MAPIMailbox::Synchronize - Getting UIDProperty from RIMCalendar failed for %s.",
               m_Name );
    bResult = false;
    goto __end;
  }
  lApptRefId = pAppointmentUID->GetUID();

  /* Get the RelatedTo Id */
  RIMEvent::RelatedToIDProperty* pAppointmentRelatedTo;
  if( CalendarVevent.GetProperty( &pAppointmentRelatedTo ) )
  {
    lApptParentRefId = pAppointmentRelatedTo->GetRelatedToID();
    RIMEvent::RecurrenceIDProperty* pRecurrenceID;
    if( CalendarVevent.GetProperty( &pRecurrenceID ) )
```

```
14320        {
               tInstanceDate = pRecurrenceID->GetRecurrenceID();
               UnixTimeToFileTime( tInstanceDate, ftInstanceDate );
             }
           }
14325
           /* Get the Sequence # */
           RIMEvent::SequenceProperty* pAppointmentSequenceNum;
           if( !CalendarVevent.GetProperty( &pAppointmentSequenceNum ) )
           {
14330        DebugLog::Printf( DebugLog::LOG_WARNING,
                       "MAPIMailbox::Synchronize - Getting SequenceProperty from RIMCalendar failed for %s.",
                       m_Name );
             bResult = false;
             goto __end;
14335      }
           lApptDeviceSeqNum = pAppointmentSequenceNum->GetSequenceNumber();

           // Search for state info corresponding to this ref id
           hResult = MAPIAllocateBuffer( sizeof( SBinary ), reinterpret_cast<VOID**> ( &pbinStateSourceKey ) );
14340      if( CallFailed( hResult ) )
           {
             ReportError( DebugLog::LOG_WARNING, mailbox_fcn, "MAPIAllocateBuffer", hResult );
             bResult = false;
             goto __end;
14345      } // if
           pbinStateSourceKey->lpb = 0;
           pbinStateSourceKey->cb = 0;
           m_CalSyncStateMutex.Lock();
           bFound = m_pCalendarState->QueryByRefId( lApptRefId, pbinStateSourceKey,
14350                                    &lStateParentRefId, &ftStateLastModified,
                                         &lStateDeviceSeqNum, &lStateDesktopSeqNum,
                                         &fStateDelInProgress, &fStateModInProgress );
           m_CalSyncStateMutex.Unlock();
           // If state info exists
14355      if( bFound )
           {
           // Get item sequence number and compare to see if item needs to be filtered
             if( lStateDeviceSeqNum > lApptDeviceSeqNum )
             {
14360          // filter
               pCalendarEvent = 0;
               pAppointment->GetNextProperty( &pCalendarEvent );
```

```
      continue;
    }
// If not filtered, use source key (and possibly instance date) to retrieve item
    // using MAPI. Get the start and end time to generate a CDO filter.

// Get contents table for calendar folder
hResult = m_pFolders[ CALENDAR ]->GetContentsTable( 0, &pContentsTable );

if( CallFailed( hResult ) )
{
  ReportError( DebugLog::LOG_WARNING, mailbox_fcn, "GetContentsTable", hResult );
  bResult = false;
  goto __end;

} // if

//  Set properties we are interested in.
hResult = pContentsTable->SetColumns( reinterpret_cast<SPropTagArray*> ( &sptaAppointmentProps ), 0 );
if( CallFailed( hResult ) )
{
  ReportError( DebugLog::LOG_WARNING, mailbox_fcn, "SetColumns", hResult );
  bResult = false;
  goto __end;
} // if
// Restrict the rows returned to only those with a matching Source Key value.
sSourceKeyRes.rt = RES_CONTENT;
sSourceKeyRes.res.resContent.ulFuzzyLevel = FL_FULLSTRING;
sSourceKeyRes.res.resContent.ulPropTag = PR_SOURCE_KEY;
spvSourceKey.ulPropTag = PR_SOURCE_KEY;
spvSourceKey.Value.bin.cb = pbinStateSourceKey->cb;
spvSourceKey.Value.bin.lpb = pbinStateSourceKey->lpb;
sSourceKeyRes.res.resProperty.lpProp = &spvSourceKey;
hResult = pContentsTable->Restrict(&sSourceKeyRes, TBL_BATCH);
if( CallFailed( hResult ) )
{
  // Query failed.
  ReportError( DebugLog::LOG_WARNING, mailbox_fcn, "Restrict", hResult );
  goto __end;

} // if

// Get all matching rows. Should only be one, otherwise error.
hResult = HrQueryAllRows( pContentsTable, 0, 0, 0, 0, &pRows );
```

```
if( CallFailed( hResult ) )
{
   ReportError( DebugLog::LOG_WARNING, mailbox_fcn, "HrQueryAllRows", hResult );
   goto __end;
} // if

if( pRows->cRows != 1 )
{
   // error: should only be one row returned
}

// If this is a root appointment, indicated by no related-to id, use start and end time for filter
if( !lApptParentRefId && !lStateParentRefId )
{
   ftStartTimeFilter = pRows->aRow[ 0 ].lpProps[ 4 ].Value.ft;
   ftEndTimeFilter = pRows->aRow[ 0 ].lpProps[ 5 ].Value.ft;
}
// Else if this is exception
else
{
   // Open the root appointment
   pRootAppointment = OpenMessage( reinterpret_cast<LPENTRYID>(pRows->aRow[ 0 ].lpProps[ 0 ].Value.bin.lpb),
                                   pRows->aRow[ 0 ].lpProps[ 0 ].Value.bin.cb,
                                   CALENDAR );

   // Get the attachment table for this appointment

   hResult = pRootAppointment->GetAttachmentTable( 0, &pAttachTable );
   if( CallFailed( hResult ) )
   {
      ReportError( DebugLog::LOG_WARNING, mailbox_fcn, "GetAttachmentTable", hResult );
      bResult = false;
      goto __end;
   } // if


   //  Set properties we are interested in.
   hResult = pAttachTable->SetColumns( reinterpret_cast<SPropTagArray*> ( &sptaAttachProps ), 0 );
   if( CallFailed( hResult ) )
   {
      ReportError( DebugLog::LOG_WARNING, mailbox_fcn, "SetColumns", hResult );
      bResult = false;
```

```
                goto __end;
14450         } // if


              // ******************************
              // *** Process Attachments ***
14455         // ******************************

              // Process all attachments.
              hResult = HrQueryAllRows( pAttachTable, 0, 0, 0, 0, &pAttachRows );
              if( CallFailed( hResult ) )
14460         {
                ReportError( DebugLog::LOG_WARNING, mailbox_fcn, "HrQueryAllRows", hResult );
                bResult = false;
                goto __end;
              } // if
14465         // Call GetInstanceFilter to get start & end time for CDO filter, instance is Recurrence-ID
              UnixTimeToFileTime(tInstanceDate, ftInstanceDate );
              GetInstanceFilter( pRootAppointment, pAttachRows, pAttachRows->cRows,
                        ftInstanceDate, &ftStartTimeFilter, &ftEndTimeFilter );

14470       }

          // Using CDO filter, obtain appt object and update using values contained in the RIMCalendar
            GetCDOAppointment( spAppointmentItem, spCalendarFolder,
                        ftStartTimeFilter, ftEndTimeFilter,
14475                   pRows->aRow[0].lpProps[2].Value.l);

          }
          else
          {
14480     // Else if no state record for this item, then it's a new record
            // If the item is a child appointment, indicated by Related-To property
              if( pAppointmentMethod->GetMethod() == RIMCalendar::CANCEL )
              {
                // No state info, so can't delete it. Skip and go to next event.
14485         }

              if( lApptParentRefId )
              {
                // Retrieve state info for parent. Will need to identify instance and to update state.
14490           // Search for state info corresponding to the parent ref id
                hResult = MAPIAllocateBuffer( sizeof( SBinary ), reinterpret_cast<VOID**> ( &pbinStateSourceKey ) );
```

```
if( CallFailed( hResult ) )
{
   ReportError( DebugLog::LOG_WARNING, mailbox_fcn, "MAPIAllocateBuffer", hResult );
   bResult = false;
   goto __end;
} // if
m_CalSyncStateMutex.Lock();
bFound = m_pCalendarState->QueryByRefId( lApptParentRefId, pbinStateSourceKey,
                        &lStateParentRefId, &ftStateLastModified,
                        &lStateDeviceSeqNum, &lStateDesktopSeqNum,
                        &fStateDelInProgress, &fStateModInProgress );
m_CalSyncStateMutex.Unlock();

// Search for parent item. Table columns will be source key, inet article #, duration, last mod
// Restrict the rows returned to only those with a matching Source Key value.
sSourceKeyRes.rt = RES_CONTENT;
sSourceKeyRes.res.resContent.ulFuzzyLevel = FL_FULLSTRING;
sSourceKeyRes.res.resContent.ulPropTag = PR_SOURCE_KEY;
spvSourceKey.ulPropTag = PR_SOURCE_KEY;
spvSourceKey.Value.bin.cb = pbinStateSourceKey->cb;
spvSourceKey.Value.bin.lpb = pbinStateSourceKey->lpb;
sSourceKeyRes.res.resProperty.lpProp = &spvSourceKey;
hResult = pContentsTable->Restrict(&sSourceKeyRes, TBL_BATCH);
if( CallFailed( hResult ) )
{
   // Query failed.
   ReportError( DebugLog::LOG_WARNING, mailbox_fcn, "Restrict", hResult );
   goto __end;

} // if

// Get all matching rows. Should only be one, otherwise error.
hResult = HrQueryAllRows( pContentsTable, 0, 0, 0, 0, &pRows );
if( CallFailed( hResult ) )
{
   ReportError( DebugLog::LOG_WARNING, mailbox_fcn, "HrQueryAllRows", hResult );
   goto __end;

} // if

if( pRows->cRows != 1 )
{
   // error: should only be one row returned
```

```
14535           }
                // Build CDO filter using date/time in Recurrence-ID property, plus duration
                UnixTimeToFileTime(tInstanceDate, ftStartTimeFilter );
                UnixTimeToFileTime((tInstanceDate+pRows->aRow[0].lpProps[2].Value.l*60), ftStartTimeFilter );
                // Retrieve appt object
14540           GetCDOAppointment( spAppointmentItem, spCalendarFolder,
                        ftStartTimeFilter, ftEndTimeFilter,
                        pRows->aRow[0].lpProps[2].Value.l );
            }
        // Else
14545       else
            {
            // New stand alone appointment. Create appt object.
              spCalendarMessages = spCalendarFolder->GetMessages();
              spAppointmentItem = spCalendarMessages->Add();
14550       }
        }
        // If this is a PUBLISH method
        if( pAppointmentMethod->GetMethod() == RIMCalendar::PUBLISH )
        {
14555     RIMEventtoCDOAppointment(&CalendarVevent, spAppointmentItem );
          spAppointmentItem->Update(true,true);

        // Update state info
          spAppointmentSourceKey = spAppointmentFields->GetItem((long)PR_SOURCE_KEY);
14560     vtAppointmentSourceKey = spAppointmentSourceKey->GetValue();
          vtLastModified = spAppointmentItem->GetTimeLastModified();
          if(!VariantTimeToSystemTime(vtLastModified, &stLastModified) ||
            !SystemTimeToFileTime(&stLastModified, &ftLastModified))
          {
14565       DebugLog::Printf( DebugLog::LOG_WARNING,
                    "MAPIMailbox::RIMMeetingtoMAPIMeeting - Converting VariantTime to FileTime Failed." );
            bResult = false;
            goto __end;
          }
14570
          if( !(pbinStateSourceKey->lpb) )
          {
            // JAG Note: Redo this whole thing! Uckkk!
            hResult = MAPIAllocateMore( strlen(_bstr_t(vtAppointmentSourceKey))/2,
14575                       pbinStateSourceKey,
                            reinterpret_cast<VOID**> ( &(pbinStateSourceKey->lpb) ) );
            if( CallFailed( hResult ) )
```

```
                {
                    ReportError( DebugLog::LOG_WARNING, mailbox_fcn, "MAPIAllocateMore", hResult );
14580               bResult = false;
                    goto __end;
                } // if
                if(!FBinFromHex(_bstr_t(vtAppointmentSourceKey), pbinStateSourceKey->lpb))
                {
14585               //error
                }
                pbinStateSourceKey->cb = strlen(_bstr_t(vtAppointmentSourceKey))/2;
              }
              m_CalSyncStateMutex.Lock();
14590         m_pCalendarState->UpdateStateRecord(lApptRefId, pbinStateSourceKey, 0,
                                  lApptParentRefId ? &ftInstanceDate : 0,
                                  lApptParentRefId,
                                  &ftLastModified,
                                  lApptDeviceSeqNum, 0, false, false );
14595         m_CalSyncStateMutex.Unlock();

            }
           // Else if this is a CANCEL method
            else if( pAppointmentMethod->GetMethod() == RIMCalendar::CANCEL )
14600       {
              spAppointmentItem->Delete();
              spAppointmentItem = 0;
            // Delete any state info for this item
              m_CalSyncStateMutex.Lock();
14605         m_pCalendarState->DeleteByRefId( lApptRefId );
              m_CalSyncStateMutex.Unlock();
            }

            pCalendarEvent = 0;
14610       pAppointment->GetNextProperty( &pCalendarEvent );
          } // while

        }
        catch( ... )
14615   {
          ReportException(mailbox_fcn);

          bResult = false;
          goto __end;
14620
```

```
    } // Exception handling

__end:
    try
14625 {
        // Cleanup.
        if( pbinStateSourceKey )
        {
            MAPIFreeBuffer( pbinStateSourceKey );
14630   } // if

        return( bResult );

    }
14635 catch( ... )
    {
        // Cleanup failed;  not critical (we hope).
        ReportException(mailbox_fcn);

14640   return( bResult );

    } // if

#else
14645 // Desktop redirector somehow called calendar method. Error.
    DebugLog::Printf( DebugLog::LOG_ERROR,
            "MAPIMailbox::Synchronize - Desktop Redirector accessed calendar method." );
    return( false );

14650 #endif

}
MAPIMailbox.cpp
```

Invention Disclosure Form

DISCLOSURE DATE:

Reference Number:
TO BE ASSIGNED BY:
03/13/00 4:53 PM ~~02/21/00 6:09~~

THE PURPOSE OF THIS FORM IS TO:

- bring to Chuck Meyer's attention the development of ideas that are believed to be novel and of value to RIM;
- provide a description of the Invention that establishes an invention date;
- provide RIM's outside patent counsel with a description of the Invention that facilitates processing of a patent application.

Complete this form by typing the information requested. Submit the completed disclosure form with any additional material requested below to Chuck Meyer.

1. TITLE OF INVENTION: Enter a short descriptive phrase that will serve as the title of the Invention.

[redacted]

2. DESCRIPTION OF INVENTION: Enter a brief description of the nature and application of the Invention.

This invention will allow "over the air" changes on a PDA calendar to be synchronized with the data on the host calendar. This includes all types of calendar entries, including recurring appointments and exceptions to a recurrence. All operations will be supported: creation, modification, and deletion of appointment entries. Conflicts that occur during synchronization are resolved without user interaction based on a simple [redacted] model where an end point is designated the authority in any dispute. [redacted] during configuration of the calendar synchronization feature. The process will allow for [redacted] There will also be a "turn off" option to stop the synchronization of calendar events.

3. Identify the projects and products where the Invention may be incorporated.

Blackberry
Proton
Future PDA products

4. The following dates apply to the Invention:

a) Date marketing began (or is planning to begin) for any products utilizing the Invention: __/__/__.
b) Date RIM shipped (or has plans to ship) any product utilizing the Invention: __/__/__.
c) Date any written material in which the Invention is described, has been (or will be) distributed:
d) If the Invention has been described to anyone outside of RIM who has not signed a confidentiality agreement enter date, names, and circumstances surrounding the disclosure: N/A
e) If the Invention has been used by anyone outside of RIM enter date, names and circumstances: N/A
f) First recorded a description of the Invention __ in _____ presently available at_____ _____.
g) When was a model of the Invention completed: __/
h) When was a photo of the model taken: N/A.
i) Device or system utilizing the Invention first tested on __/ by _____ at _____. Was the test successful? _____

Inventors:

FULL NAME (TYPE)	SIGNATURE	Date
Hugh Hind		
Craig Dunk		

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5. Describe the concern of problem your Invention addresses.

Currently the device provides a calendar application where users may maintain appointment and event-related information. Information stored on the host and device are distinct, with the synchronization of the two separate databases only occurring as part of a serial synchronization process when the pager is placed in the docking cradle [redacted] without user intervention is desired. This process must be able to synchronize [redacted] Conflicts can be avoided with [redacted]; however, this process will use only one step to reduce the number of data transfers between the device and host.

6. Identify any devices or systems known to you that address the same concern or problem. (Also include those developed by RIM and any known patents or publications that address the problem (attach copies).

7. Identify the differences between your Invention and each known device or article described above and describe any impact those differences can have in providing value to _____.

N/A

8. Identify any other unique aspects of your Invention.

9. Provide a detailed description of your Invention. Attach any drawings, circuit diagrams, or other documentation that describes the Invention; where appropriate, apply reference numerals to drawings and use those reference numerals in your detailed description. You must disclose the best mode you know for practicing the Invention.

Inventors:

Hugh Hind		
FULL NAME (TYPE)	SIGNATURE	Date
Craig Dunk		
FULL NAME (TYPE)	SIGNATURE	Date

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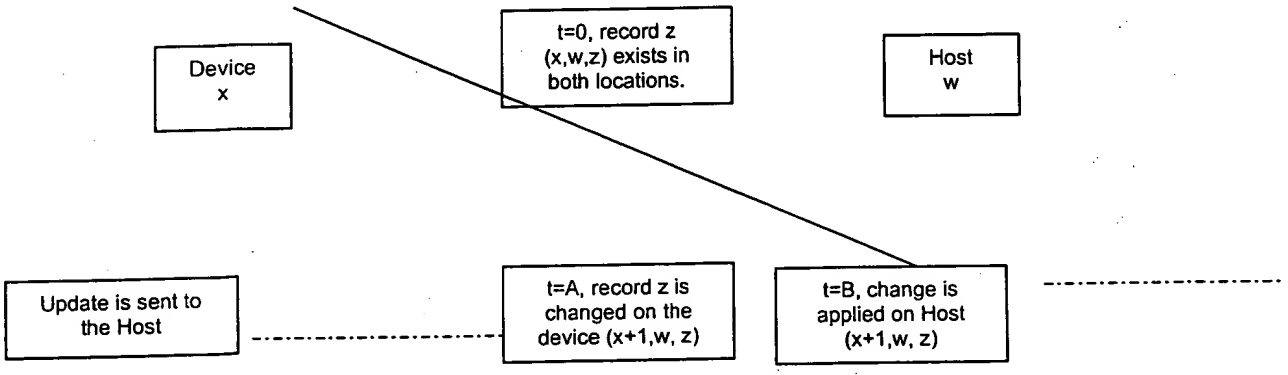
Fig 1: Calendar Record Synchronization for a Device and one Host



Firstly let us consider the case when no conflict occurs. Each record entry has two version numbers: "host version" "w" and "device version" "x". Both the device and host recognise these numbers in the record entry. At t=0 (where t is time), the device and host are synchronized and both contain the record which has ~~the~~ version numbers w,x and ~~the~~ record ~~z number~~ (e.g. (x,~~y~~w,z)). Suppose the device makes a change. To illustrate, in Fig.1, at t=A, the device makes a change to the record z and updates the device version to x+1 associated with the record. Preferably, the updated record is sent via the wireless network to the host in order to synchronize the device and host. At t=B, the host makes the changes and updates its record z to x+1.

~~Conversely~~W~~,~~ when the host makes a change to record z, it updates the host version number to w+1 and sends the update via the wireless network to the device at t=A. At t=B, the device accepts the change and updates its host version number to w+1.

A conflict occurs when either the host or device makes a change to a record before t=B (i.e., before notification of the change arrives to the device or host respectively after the change made at t=A). The version numbers are now out of sync. In this case one of the changes will be discarded based on the "master" setting which the user selected. This setting selects either the host or the device so that when a conflict arises the "master" will override all changes. No

Inventors:

Hugh Hind		
FULL NAME (TYPE)	SIGNATURE	Date
Craig Dunk		
FULL NAME (TYPE)	SIGNATURE	Date

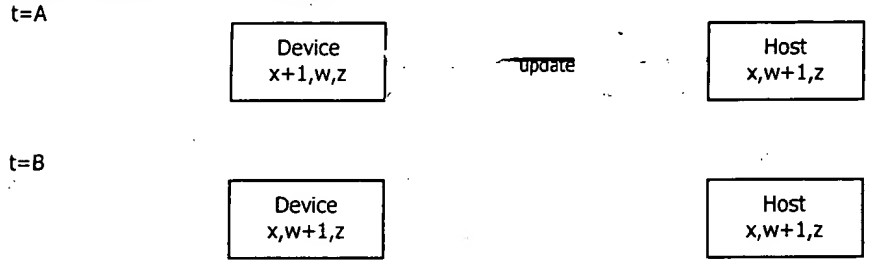
This and

An update conflict occurs when:
A change occurs on the Host (w+1) before t=B and arrives to the device after t=A (and vice versa)

No update conflict occurs when:
A change on the Host and an update on the device occur either entirely before t =A or entirely after t=B

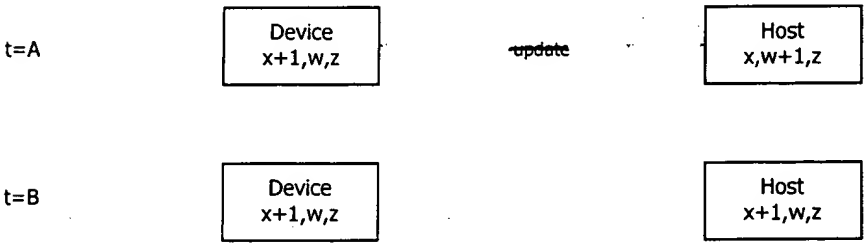
conflicts occur if the "second" changes occurs on ~~both~~ the device or ~~and~~ host ~~take place~~ entirely before an update occurs, t<A or entirely after the update occurs t>B.

Fig 2.1: Conflict when Host is Master



For example, in Fig 2.1, the host is set as the master. At t=A (where t is time), the host makes a change to record z, increments the host version number to w+1, and sends an update to the device. However, the device has also made a change to record z, incremented the device version number to x+1, and sent an update to the host before receiving the host changes. The two records on the devices are now out of sync. At t=B, the host, being the master will discard the device changes. The device upon receipt of the host's update will accept the changes from the host and discard the changes the device made. The device will increment the host version number to w+1 and decrement the device version number back down to x.

Fig 2.2: Conflict Resolution when Device is Master



Conversely, in Fig 2.2, the device is set as the master. At t=A, both the device and host make an update at the same time, incrementing their respective version numbers to x+1 and w+1. At t=B, the device, being the master, will discard the host's changes. The host, upon receipt of the device's update, will discard the previous change the host made, and accept the device's changes. The host will increment the device version number to x+1 and decrement the host version number to w.

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Hugh Hind		
FULL NAME (TYPE)	SIGNATURE	Date
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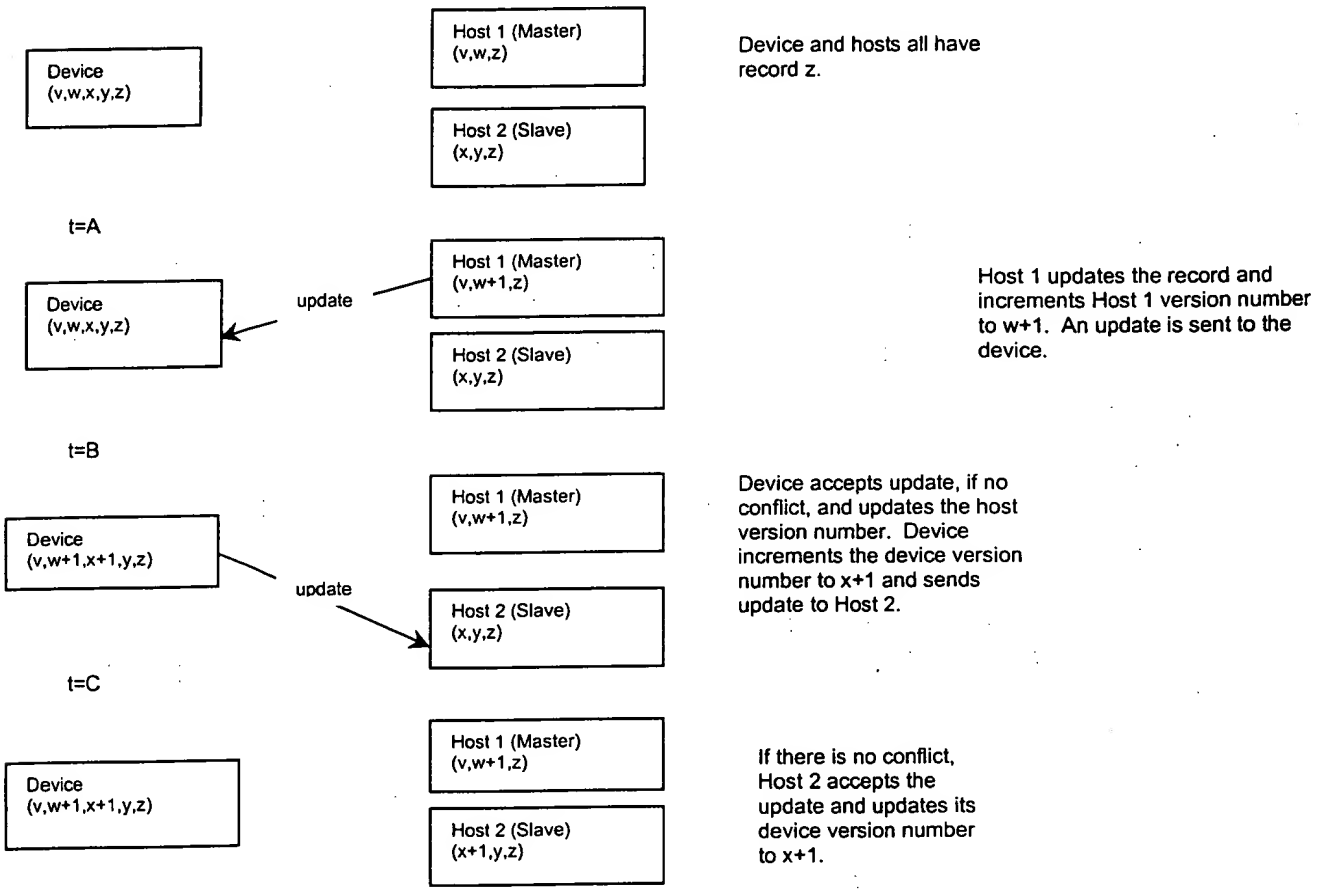
Fig 3: Multiple Hosts –Update sent from Master Host



The device may also communicate with more than one host (as in Fig. 3). In the preferred embodiment, the hosts do not communicate with each other. In this embodiment, one of the hosts is set as the "master". The device recognizes this setting. The other hosts, or "slave" hosts, recognize the device as their "master".

Indices are scrambled in this paragraph .... In Fig. 3, at t=0 (where t is time), the device and hosts all contain the record. The record is represented by a number z. All hosts have a unique host version number and a unique device version number. The diagram illustrates an example of one device and two-host system. The master host contains the number (v,w,z). The number "w" is the host version number. The master host also has a device version number "v".

Inventors:

Hugh Hind

FULL NAME (TYPE)	SIGNATURE	Date
Craig Dunk		
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The slave host contains the number (x,y,z). The slave host has a host version number "y" and its own device version number "x". The device contains all these numbers (v,w,x,y,z)

At t=A, the master host updates the record z. The master host then increments its version number to w+1 and sends an update to the device via the wireless network. At t=B, if there is no conflict, the device accepts the change and increments the host version number to w+1. The device also increments the device version number that is associated with the slave host to x+1 and sends an update to the slave host. At t=C, the slave host accepts the change and increments its device version number to x+1, as long as there is no conflict.

Fig 4: Multiple Hosts--Update from the Device

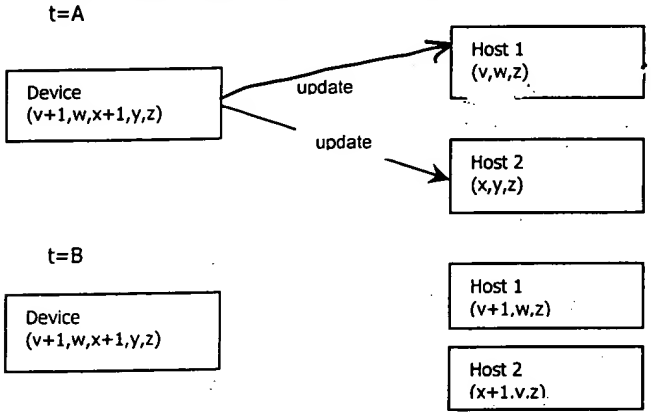
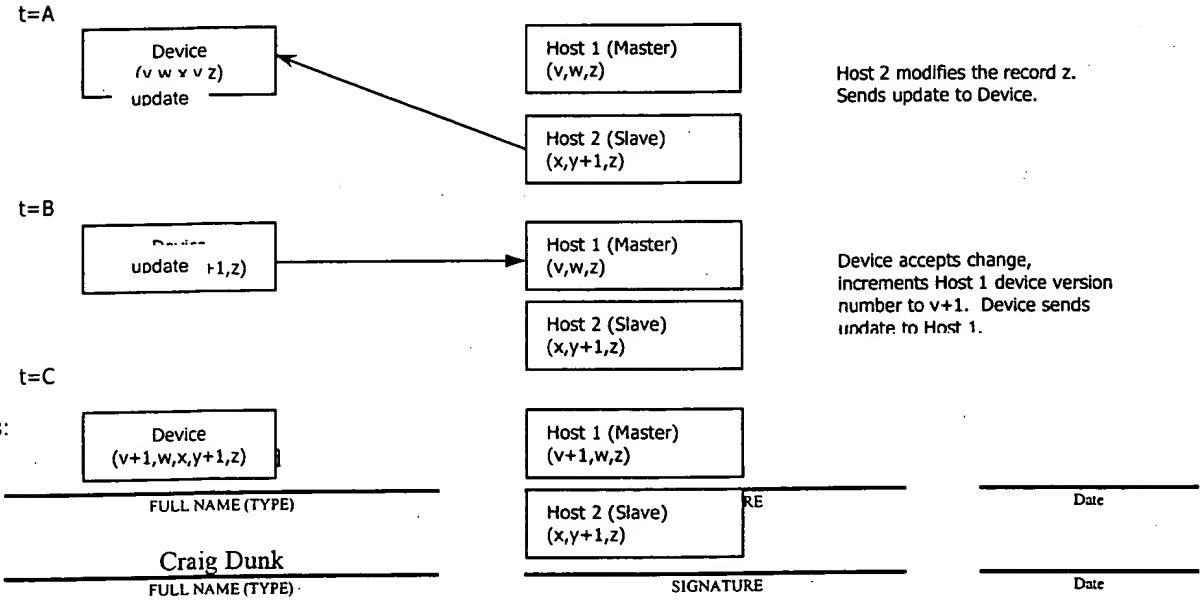


Fig 4 illustrates when the device updates the record z. At t=A, it will update the device version numbers to v+1 and x+1. The device sends an update to both hosts over the wireless network. At t=B, if there is no conflict with the hosts, they accept it and update their own device version numbers accordingly. In this situation, the host or the device could be the master.

Fig 5: Multiple Hosts--Update from the Slave Host



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Craig Dunk
FULL NAME (TYPE) _____ SIGNATURE _____ Date _____

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Host 1 accepts change

Fig 5 illustrates the situation where the slave host makes an update. At t=A (where t is time), the slave host has changed the record z, increments its host version number y to y+1, and sends an update over the wireless network to the device. At t=B, the device accepts the modifications and changes the record. The device increments the master host device number from v to v+1, and sends an update to the master host. At t=C, the master host accepts the change and increments its device version number to v+1.

Fig 6: Multiple Hosts -- Conflict Resolution Between Master and Device

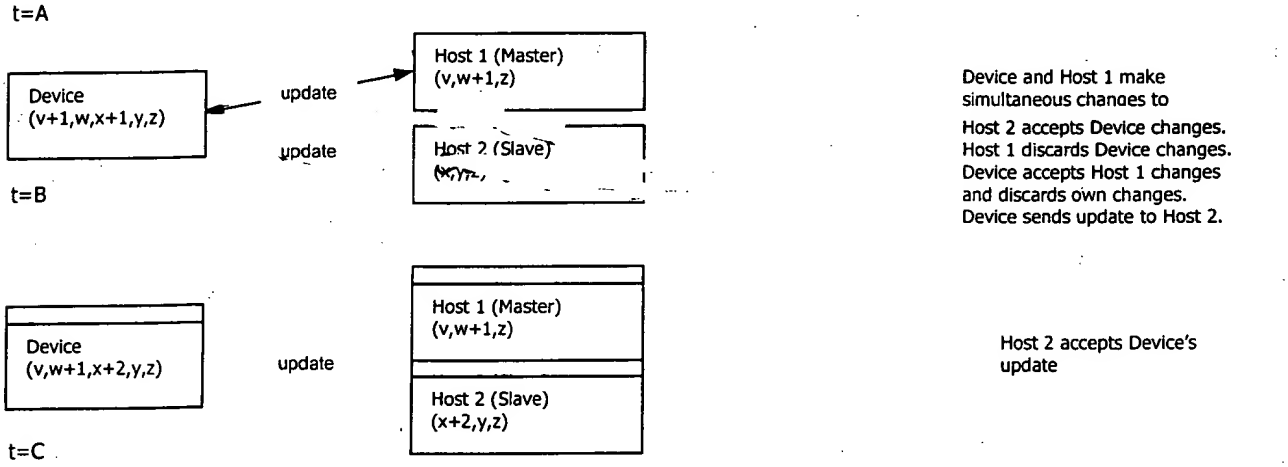
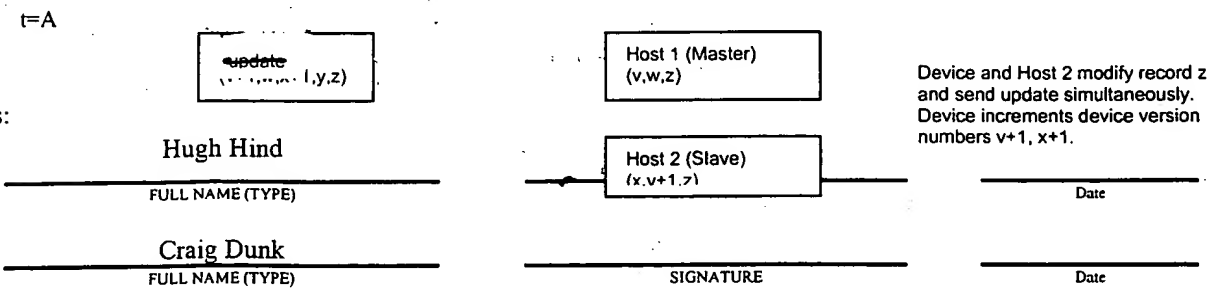


Fig 6 illustrates a conflict resolution in a situation with multiple hosts. At t=A (where t is time), the master host and device make changes to record z. The device increments the device version numbers to v+1 (for the master host) and to x+1 (for the slave host). The master host increments the master host version number from w to w+1. The master host sends an update over the wireless network to the device. The device simultaneously sends an update to the master host and slave host. At t=B, the slave host accepts the device changes and increments its device version number to x+1. The master host discards the device changes. Upon receipt of the master host changes, the device discards its earlier changes and accepts the master host changes. The device decrements the master host device version number back to v, increments the master host host version number to w+1, and increments the slave host device version number to x+2. The device sends an update to the slave host. At t=C, the slave host accepts the device changes and increments its device version number to x+2.

Fig 7: Multiple Hosts –Conflict Resolution between Slave Host and Device



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Hugh Hind
FULL NAME (TYPE) SIGNATURE Date

Craig Dunk
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update

t=B

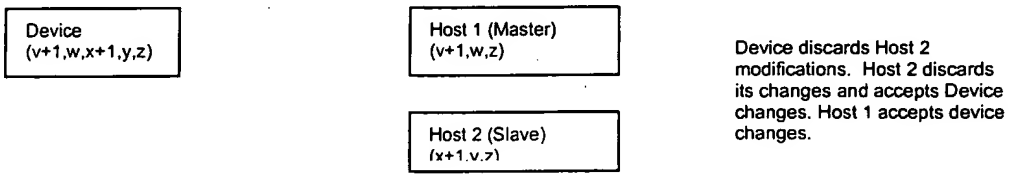

Fig 7 illustrates a conflict resolution between the device and slave host when the slave host sends out an update. At t=A, the slave host changes the record z and increments its host version number to y+1. The device also changes the record and increments the device numbers for the master and slave hosts to v+1 and x+1 respectively. Both the slave host and device send and update via the wireless network simultaneously. There now exists a conflict between the record that the device holds and the update that was sent to the device. Because the device acts as a "master" to the slave host, at t=B, the device discards the changes that the slave host made. ~~An update is sent from the device to the slave host and the slave host discards the previous update and accepts the device's changes.~~ The device sends an update to the master host. The master host will make the necessary updates as long as there is no conflict. The slave host decrements the host version number back to y and increments the device version number to x+1. ~~The device then sends an update to the master host. The master host will make the necessary updates as long as there is no conflict.~~

Fig 7.2: Multiple Hosts --Conflict between Device and Master Host after Slave Host has sent an update.

t=B

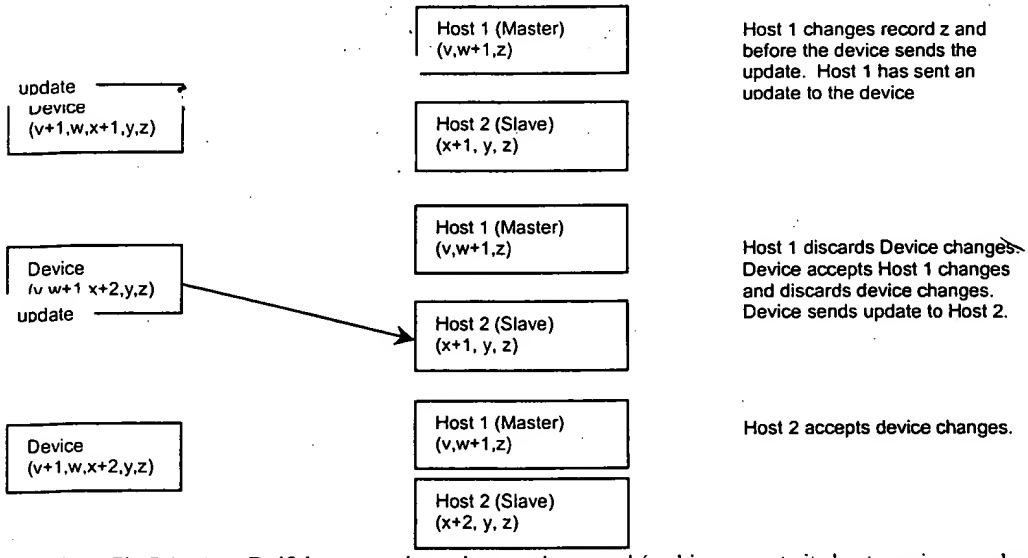

Fig 7.2 continues from Fig 7.1. At t=B, if the master host changes the record (and increments its host version number to w+1) before it receives the device's update, there is now a conflict. At t=C, the master host will discard the update from the device. The device also discards the changes that it made and accepts the master host's update. The device decrements the master host device

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Hugh Hind

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Craig Dunk

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version number back to v, and increments the slave host device version number to x+2. The device sends an update to the slave host. The slave host accepts the update and increments its device version number.

Fig. 8: Multiple Hosts – Conflict Resolution when the Device is Master

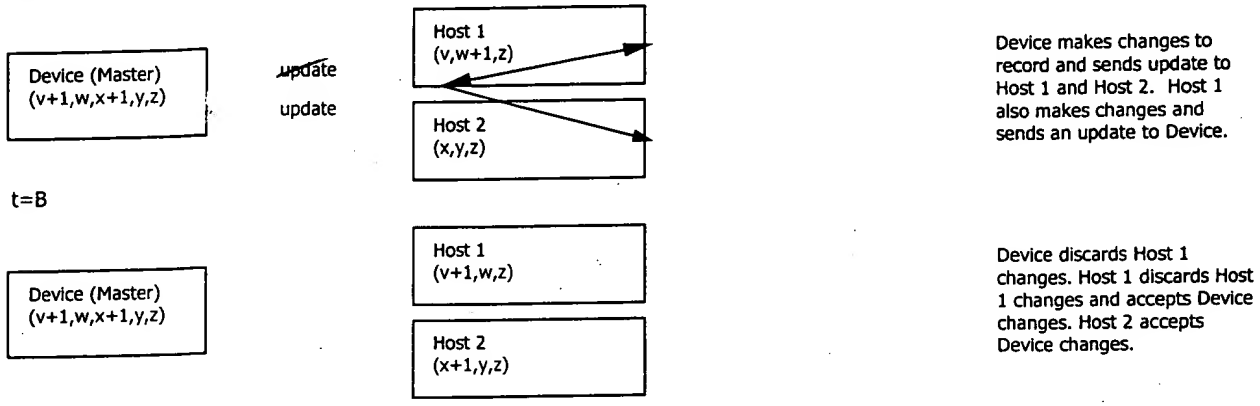

Fig 8 illustrates the situation where the device has the "master" setting for all the hosts and has a conflict with either host. At t=A, the device makes a change to record z. The device increments the device version numbers for Host 1 and Host 2 to v+1 and x+1 respectively. Then the device sends an update to the hosts over the wireless network. Host 1 makes changes to record z and increments its host version number to w+1. Host 1 then sends out an update at the same time as the device or before Host 1 has received the device's update. The host 1 record and the device record are out of sync. At t=B, host 2 accepts the Device changes and increments its device version number to x+1. The device, because it is set as the master, discards Host 1's changes. Host 1 accepts the device changes and discards its own changes. Host 1 increments the device version number to v+1 and decrements its host version number to w.

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Hugh Hind		
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